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*On the Principles of Railway Management**, *and on the profitable Increase in the Traffic produced by great Reductions in the Charges.*

By J. Butler Williams, F.S.S., F.G.S.

[Read before the Statistical Society of London, 16th March, 1846.]

When the first projects for railways to be worked with locomotive power were discussed and brought under public notice, it was anticipated that the chief source of profit would be found in the conveyance of goods and merchandise.

The unexpected and extraordinary increase in the number of passengers, however, produced by the combined economy of time and money, rendered the passenger traffic more immediately and evidently profitable; hence it naturally engrossed the attention of the managers whose entire energies were required to provide great accommodation, combined with speed, safety, and regularity.

So rapid has been the increase in the number of the passengers, increasing with every extension of the railway system, that a corresponding demand on the resources of Companies, and the skill and energy of their managers, has caused the conveyance of goods to receive a less share of their attention than it merits, considering its importance in a commercial point of view, and as a source of profit to the capitalist.

Of late the old-established lines have increased the facilities for the carriage of goods, and provided accommodation apparently more nearly commensurate with the demand. So far as the experiment has been carried, it has shewn generally that the net revenue from the goods traffic has been increasing in a quicker ratio than the net revenue from passengers.

On the London and Birmingham, Grand Junction, and Great Western Railways, the income from the goods traffic now ranges from 25 to 40 per cent. of that derived from passengers, the increase in the revenue from the goods traffic having been within twelve months about 30 per cent. on each of these great trunk lines.

On the York and North Midland, the Paris and Rouen, the Paris and Orleans, and similar lines, the goods traffic now produces a revenue about equal to half of that derived from passengers, the increase having been in the same period about 30 per cent.

Late arrangements made by the South Eastern Company for the more economical and regular carriage of goods have caused an increase of revenue from that source of upwards of 100 per cent.

Important as these facts are to shew the advantages of a movement in the right direction, I am convinced that they do not represent even approximately the vast increase in the goods traffic which must follow upon a liberal management and more extended accommodation.

The inland transit of colonial produce, manufactured articles, and generally of valuable goods of small bulk, the relative value of which is but little enhanced by the expense of carriage, may be deemed to be secured for railroads, provided they offer the requisite accommodation.

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* The investigation of one branch only of the wide subject of Railway Management is here attempted. I have pleasure in acknowledging that for some of the illustrations I am indebted to valuable suggestions from Mr. Chadwick; for others to statistical details of the working of railways in Belgium, published by M. Delaveleye, Brussels, 1844.

By a speedy and economical conveyance of small parcels, another field of enterprise and source of profit is opened to railways without the possibility of competition by other modes of conveyance. I shall again refer to this branch of traffic, which I believe to have been too much neglected and effectually discouraged by irregular and high charges, either on the supposition that the returns would scarcely be commensurate with the additional trouble entailed, or from an erroneous view of its capabilities of expansion.

But the most important field of all, because the most exhaustless, remains to this time nearly unoccupied by railways. I refer to the conveyance of agricultural produce and bulky materials, which are either conveyed by canals or common roads, or too frequently remain confined in districts where their value cannot be turned to the best public or private advantage.

Coals and cattle are, it is true, carried to some extent by railway—but that this extent is insignificant as compared with the population to be supplied, although demonstrated by the returns of various railways, might be assumed upon simple reference to the tariffs which, except under peculiar circumstances, are too high, not only to encourage but actually to admit of their conveyance by railway with any benefit to the producers.

Timber, marble, slate, building-stone, lime, manure, minerals—also agricultural produce, flour, &c., will follow the channel of railway transit only when the cost by this mode of conveyance shall have been brought to very low limits, corresponding in fact with, or lower than, the charges of conveyance by canal.

I propose investigating the problem of a highly economical carriage of goods, chiefly in relation to the profitable RETURN that it is calculated to offer to the capitalist, by rendering much more productive the existing channels of railway communication. But although confining myself to that view of the question, I cannot be insensible to the great improvement that such a measure would effect in the commercial prosperity of districts, rich in natural and agricultural produce, but kept comparatively poor and unproductive from want of a cheap outlet. With diminution in the cost of conveyance, the producer derives in the first instance a corresponding increase in the net profit: afterwards this increase in the profit is shared, in varying proportions, between him and the consumer. The existence or non-existence of ready and economical outlets at once establishes a broad distinction between separate localities which individual energy and enterprise cannot obliterate. As regards the price of labour, the perfection of machinery, and even the skill of the workmen, the conditions of production may in most manufactures be made to assimilate. But individual enterprise cannot obtain at will an expeditious and economical means of transit; and districts otherwise favoured may from its want remain barren and profitless.

The interests of the public and the railway companies are fortunately identical; for, the only way in which railways can return profits from the conveyance of heavy goods and bulky materials is by carrying them in great quantities; and quantity can be secured by no other means than an exceedingly low scale of charges. This I hope to succeed in establishing.

A railway, with its complete establishment, may be likened to a great machine or engine adapted to purposes of transit. The original cost is considerable, and its object is to economise labour.

The interest on the original cost is a most serious item which must be provided for. The produce is costly, if but little work is performed —the produce is cheap, if the machine is fully and constantly employed. To allow the machine to be idle, or to work with incomplete action, is to incur an accumulating loss for interest on the unproductive capital.

The cost of all conveyance on railways admits of being separated into two distinct elements:—

1st. The interest on the capital,—together with certain fixed charges which are independent of the greater or less use made of the railway.

2ndly. The working expenses resulting directly from the work done.

The first of these elements, viz., that consisting of the fixed charges, is not composed solely of the interest on the capital expended, but embraces also the cost of repairs of stations, goods, sheds, fencing, slopes of embankments and cuttings, drainage, renewal of sleepers (in part), and generally such works as are essential to prevent the deterioration of the property, and are not influenced by the greater or less traffic of the line.

It embraces also a certain proportion of the expenses of management, salaries to secretaries, officers, police, and others, who although they may be increased in number with an increase in the traffic, are not increased in proportion to the extension of the traffic.

The second element embraces the cost of haulage, properly speaking, that is, repair and maintenance of engines, trucks, carriages, &c.; consumption of fuel, oil, grease, &c.; wages of engine-drivers, stokers, guards, porters, &c.; maintenance of the permanent way in so far as it is affected by the traffic; and proportionate increase in the number of managing officers, superintendents, and workmen, in as far as that increase is required by additional traffic.

The first element varies with every railway according to the character of the country traversed, the traffic to be provided for, the views of the directors, the skill of the engineer, &c.

The average cost of railways has been—

		Per mile.
In England	about	£31,000
In Scotland	,,	22,000
In Ireland	,,	22,000

(Vide Porter's "Traffic Returns," Statistical Journal, vol. vii., p. 176.)

In Belgium	about	£18,000

(Vide "Report of the Statistical Bureau," Delaveleye, Brussels, 1844.)

In France	about	£41,000

(Vide Claudel's "Aide-Mémoire des Ingénieurs," p. 455. Average of 5 *Metropolitan* Lines.)

The great difference to be noticed in the above statement of the average cost of railways in different countries, is not greater than the difference which will be found to exist between the cost of different lines in the same country. The causes of such differences can easily be traced, but they need not be considered in connexion with the subject under examination.

It is manifest, however, that the fixed charge which must enter as so influential an element in the cost of conveyance, will, in any comparison which we may institute, be greatly modified according to the *cost per mile* taken as the basis of the calculation, and greatly so likewise according to the *rate of interest* which may be attributed as due to the capital risked.

As variable opinions must necessarily prevail on both points, I propose to offer tabular statements of the effect of the fixed charge on the cost of conveyance, prepared on varied assumptions.

In the first instance, however, I shall confine my attention to the lowest of these estimates, because the opinions of engineers and of statists agree in establishing, that the lines to be henceforth constructed will on the average approach more nearly to the lower than the higher standard. "The Board of Trade in their Report on the South Western District, in 1845, state that the lines proposed to be made in that part of the country might be constructed for about £12,000 per mile;—and the estimated cost of the mass of new railways, projected during the last two years, ranges, with few exceptions, between £25,000 and £10,000 per mile[*]."

Perfectly responsible contractors are ready to undertake contracts for the works on the engineers' estimates. I believe, therefore, that illustrations, taking the Belgian average as the standard of cost, will be applicable to lines proposed to be made[†].

I propose taking the rate of interest at 5 per cent. per annum, and at 10 per cent.

Upon the original cost of £18,000 per mile, a first demand, if the rate of 5 per cent. interest be selected, of £900 per mile per annum *must be provided for out of the revenue from the traffic, being in nowise modified by the extent of the latter.*

To this must be added the aggregate annual outlay for those items which have been enumerated above, as being independent of the traffic, such as the maintenance of the boundary walls and fences, the repairs of the buildings, maintenance of the slopes of cuttings and embankments, drainage, &c.

I have not been able to obtain for the English railways a return of these items sufficiently comprehensive for general deductions, but for the Belgian railways, an examination of nine years' working has enabled the Statistical Bureau to determine the average as amounting to £130 per mile per annum, to be added therefore to the interest, and producing (at 5 per cent.) a fixed charge of £1030 per mile per annum, to be defrayed by tolls on the carriage of passengers and goods.

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[*] "Defects of the English System of Railway Legislation," by James Morrison, Esq., M.P., Longman, 1846, page 13.

[†] This assumption as to the cost of construction will not probably be applicable, if the numerous projects now before Parliament be carried into execution in the next three or four years. The great demand for labour and materials would, in such a case, greatly raise their prices above the existing averages, and certainly cause a departure from the estimates of even the most experienced and skilful engineers.

At 10 per cent. interest this fixed charge will be,—

Interest on £18,000	£1,800
Other fixed charges	130
Total	£1,930

This fixed charge is to be provided for as a whole by the revenue from the goods and passenger traffic. As I am at present considering only the conveyance of goods, I must strike a proportion to determine the share to be allotted to each branch. In determining this ratio, the proportion of the average returns from goods and passengers might be taken, thus making the charge to be given to the goods' branch comparatively smaller than that apportioned to the passenger branch. But inasmuch as the aim of this essay is to show, that the carriage of goods is destined to have an importance little, if at all, inferior to that now belonging to the conveyance of passengers, I propose, in the investigation, dividing this fixed charge equally between the two classes of traffic.

The tolls on goods must return, therefore, over and above the actual cost of haulage, an annual revenue per mile of £515 at 5 per cent., and £965 at 10 per cent. Distributing this over the tonnage throughout the year, if the mean amount of goods traffic be on the average per mile per annum 20,000 tons, the charge per ton per mile must be,—

			d.
At 5 per cent.	$\frac{\pounds515}{20,000}$	or	6·18
At 10 per cent.	$\frac{\pounds965}{20,000}$	or	11·58

If the traffic be increased to 40,000 tons per mile per annum, the charge per ton per mile becomes,—

			d.
At 5 per cent.	$\frac{\pounds515}{40,000}$	or	3·09
At 10 per cent.	$\frac{\pounds965}{40,000}$	or	5·79

If the traffic be raised to 200,000 tons per mile per annum, the charge per ton per mile would then be,—

			d.
At 5 per cent.	$\frac{\pounds515}{200,000}$	or	0·618
At 10 per cent.	$\frac{\pounds965}{200,000}$	or	1·158

In short, this constant charge of £515, at 5 per cent., or £965, at 10 per cent., becomes a charge on the carriage of each article, varying in the inverse ratio of the amount of traffic.

The second element, however, the cost of haulage or working expenses, must be added to obtain the total charge per ton per mile.

In endeavouring to ascertain the general average cost of the actual haulage, and other expenses dependent on the working of the lines, I have found very great variations in different lines, due in a great measure, no doubt, to the returns embracing different items of expenditure, as well as to the difference in the cost of fuel and other materials. The most complete Returns to which I have had access, are those published by the Statistical Bureau of Belgium, for upwards of two years previous to January, 1844.

If it be found, as I believe it will, when access is had to more complete information, that the English scale of working expenses is less per ton per mile than that of Belgium, the reasoning which follows will not be thereby vitiated,—the conclusion will only become more manifest.

The average working cost in Belgium has been on goods' trains ·45*d.* per ton net per mile.

The fixed and variable charges combined will then give the total cost, according to the amount of tonnage, as follows, viz.—

If the traffic be 20,000 tons per mile per annum,

1. At 5 per cent. interest on capital, charge varying with the traffic .... $\frac{£515}{20,000}$ = *d.* 6·18
$+$ Haulage charge (fixed).... = ·45
Total *d.* 6·63 per ton per mile.

2. At 10 per cent. per annum, charge varying with the traffic .... $\frac{£965}{20,000}$ = *d.* 11·58
$+$ Haulage charge (fixed) .... = ·45
Total *d.* 12·03 do. do.

With a traffic of 200,000 tons per mile per annum,

1. At 5 per cent. interest, charge varying with the traffic .... $\frac{£515}{200,000}$ = *d.* ·618
$+$ Haulage charge (fixed) .... = ·45
Total *d.* 1·068 per ton per mile.

2. At 10 per cent. interest, charge varying with the traffic .... $\frac{£965}{200,000}$ = *d.* 1·158
$+$ Haulage charge (fixed) .... = ·45
Total *d.* 1·608 do. do.

The comparison is carried out more in detail in the annexed Table (p. 107).

In Belgium, at the time to which the Returns determining the working expenses had been brought, viz., the end of 1843, the quantity of goods carried on the Government lines averaged 40,000 tons per mile per annum. At that time the actual average charge throughout the Belgian railways was 2½*d.* per ton per mile. But a reference to the table shows that, with the average traffic of 40,000 tons per mile per annum, the charge required to produce 5 per cent. interest on the capital would be 3·54*d.* Hence, on every ton of merchandise, which was then conveyed on the Belgian railways, (assuming that half the interest on the capital should be borne by the passenger and half by the goods traffic,) there was a positive loss of upwards of 1*d.* per ton per mile.

This conclusion deduced from the table, is borne out by the Returns officially issued from the Statistical Bureau, which show the Belgian Government railways to have been worked at a loss since their establishment. (Delaveleye's Report, Brussels, p. 25.)

The yearly loss may be calculated thus—

Table showing the diminution in the cost of Carriage per Ton per Mile, dependent on the Increase in the Traffic. (Original cost of Construction, £18,000 per Mile.)

Allowing Interest at the rate of 5 per cent. per Annum on the Capital.				Allowing interest at the rate of 10 per cent. per Annum on the Capital.			
Average Traffic per Mile per Annum. Tons Net.	Fixed Charge per Ton per Mile for Interest, &c.	Actual Working Expenses per Ton per Mile.	Total Charge.	Fixed Charge per Ton per Mile for Interest, &c.	Actual Working Expenses per Ton per Mile.	Total Charge.	Average Traffic per Mile per Annum. Tons Net.
	d.	d.	d.	d.	d.	d.	
20,000	6·18	....	6·63	11·58	....	12·03	20,000
30,000	4·12	....	4·57	7·72	....	8·17	30,000
40,000	3·09	....	3·54	5.79	....	6·24	40,000
50,000	2·47	....	2·92	4·63	....	5·08	50,000
60,000	2·06	....	2·51	3·86	....	4·31	60,000
70,000	1·76	....	2·21	3·31	....	3·76	70,000
80,000	1·54	....	1·99	2·89	....	3·34	80,000
90,000	1·37	·45	1·82	2·56	·45	3·01	90,000
100,000	1·24	....	1·69	2·32	....	2·77	100,000
150,000	·82	....	1·27	1·54	....	1·99	150,000
200,000	·62	....	1·07	1·16	....	1·61	200,000
300,000	·41	....	·86	·77	....	1·22	300,000
400,000	·31	....	·76	·58	....	1·03	400,000
500,000	·25	....	·70	·46	....	·91	500,000
1,000,000	·12	....	·57	·23	....	·68	1,000,000

At per mile, 40,000 times the excess of 3·54*d.* above the actual charge of 2·5*d.* per ton per mile (40,000 being the annual tonnage per mile).

Or 40,000 × 1·04*d.* = £173.

To be multiplied by 350 miles of road then at work, £173 × 350 = £60,000 yearly loss.

Such a result, viz., the loss which has been thus deduced by the theoretical investigations is not more unfavourable than that which (up to the date of the Report referred to) had attended the working of the Belgian Government railways, viz.:

"That after defraying the expenses, a surplus was left only sufficient to pay interest on the capital at the rate of 2½ per cent." And as the money for the construction of the Belgian railways has been borrowed by the State at 5 per cent. interest*, the country must provide by an annual tax for the deficiency of 2½ per cent. shewn in the working."

It is true that this 2½ per cent. cannot altogether be considered as a money loss, inasmuch as the railways afford free transit for Government despatches, for the Post Office, for military stores and ammunitions, soldiers on duty, and other demands for the public service. But all these form in the aggregate but a small part of the per centage to be provided for to meet the deficit arising from the working of the lines.

There is no doubt that Belgium has indirectly been benefited by the introduction of railways to an extent which can scarcely be over estimated, but I believe that a difference made in the principle of working the lines and the system of their management would have the effect of giving profits where loss is now incurred.

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* The interest is exactly 4·86 per cent. per annum, being the mean on various loans raised at different rates.

The inspection of the table (p. 107), in which is shown so rapid a diminution in the remunerating charge consequent on the increase of traffic, points to the guiding principle in the management of a railway.

I have stated that the average tonnage of merchandise had been only 40,000 tons per mile per annum on the Belgian railways. Now at that very time (Delaveleye, Brussels, 1844,) the average tonnage per mile per annum was, on the canals of Belgium, 400,000 tons, or ten times the quantity carried by railway. It is impossible that so marked a disproportion as this can be due to any actual inferiority in railways for the carriage of goods. The chief cause of the disproportion is the difference in the charge, which on the canals averaged 1¼*d.* per ton per mile, or one-half of those by railway. On the contrary, I believe, on the side of railways, the advantages of a speedy and certain delivery, uninterrupted by frost or by drought, are so great, in a commercial point of view, that not only can they compete with canals, but that they must ultimately supersede them, if they offer, in addition to the above advantages, that of an equal degree of economy. There can be little doubt that the railways of Belgium could, by a system of low fares and proper accommodation to commercial men, have divided with the canals that traffic of 400,000 tons; but without even encroaching upon the canal traffic, new traffic would have been created by a system of low fares.

Assuming, however, that by holding out every legitimate encouragement to commercial men to send their goods by railway, the traffic had been per mile per annum 200,000 tons instead of 40,000, charged at the canal rates of 1¼*d.*, this branch of the railway traffic would have been a source of profit instead of loss.

The table gives as the charge required to pay 5 per cent. interest with a traffic of 200,000 tons, 1·07*d.* per ton. per mile.
Assumed toll . . 1·25*d.* „ „

Profit . . . ·18*d.* „ „
Which on 200,000 per mile per annum, produces £150,
And for 350 miles of road then at work, £52,500.

While the public would thus have been benefited by the more economical carriage of their goods, the difference in the revenue would have been . . . . . Profit £52,500
instead of . . . . Loss 60,100
Or a positive difference in the annual revenue to the State of . . . . . Total £112,600
That is, upwards of 1¾ per cent. per annum on the total capital expended, viz. . . £6,300,000

It will be useful to apply the test of this table to the working of various English lines.

I have collated from a pamphlet entitled *Twenty Short Reasons for Railways being Carriers of Goods**, the following table shewing the rates charged for goods conveyed by 20 of the principal lines in England, at the date of the publication of the pamphlet.

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* Liverpool, Waring Webb, Castle Street, 1845.

Dividing them into classes of goods forwarded by the Companies as carriers and of goods forwarded by intervening carriers, and subdividing these again into heavy and bulky goods, such as grain, iron, timber, coals, &c., and into light goods, such as manufactured articles, colonial produce, &c., the average on the heavy and bulky goods is somewhat less than 2½*d.*, ranging from 1*d.* to 5*d.*, and on light goods about 5½*d.* on the average, ranging from 4*d.* to 8*d.* for railways that are their own carriers.

The charges are higher on goods forwarded by intervening carriers.

The general average on all classes of goods in these 20 railways, is 5½*d.* per ton per mile*.

COMPANIES THEIR OWN CARRIERS.

Length in Miles.	Name of Railway Company.	Rates Charged; Minimum as for Grain, Iron, Timbers; Maximum as for Light Goods in General, excluding Cartage.
118	Great Western	2·3 penny to 4·9 penny
98	Grand Junction	1·8 ,, 4·9 ,,
77	South Western	3·7 ,, 5·2 ,,
61	Newcastle and Carlisle	1·9 ,, 4·9 ,,
53	Birmingham and Gloucester	1·4 ,, 6·8 ,,
52	London and Brighton	3·0 ,, 6·9 ,,
51	Eastern Counties	3·5 ,, 8·2 ,,
46	Edinburgh and Glasgow	1·3 ,, 4·5 ,,
42	Birmingham and Derby	1·7 ,, 4·3 ,,
31	Liverpool and Manchester	2·9 ,, 5·4 ,,
31	Manchester and Birmingham	2·5 ,, 3·9 ,,
22	Glasgow and Greenock	2·2 ,, 5·4 ,,
20	Preston and Wire	5 ,, 6 ,,
	Average	2·4*d.* 5·5*d.*

GOODS FORWARDED BY INTERVENING CARRIERS.

Length in Miles.	Name of Railway Company.	Rates Charged
112	London and Birmingham	3·2 penny to 7·5 penny
88	South Eastern	2·4 ,, 6·8 ,,
72	North Midland	4·2 ,, 8·3 ,,
60	Manchester and Leeds	4 ,, 8 ,,
45	Great North of England	4 ,, 8 ,,
22	North Union	5·4 ,, 16*d.*
29	Lancaster and Union	6 ,, 18*d.*
	Averages	4·2*d.* 10·4*d.*

The comparison of this table of actual charges made on English railways, with the table of remunerative charge, will bring out some interesting results. The conclusions, however, will be less open to objection, if the comparison be instituted with a table prepared on the average cost of the existing English railways, viz., about £31,000 per mile, with allowances of 5 and 10 per cent. interest thereon respectively.

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* Since the publication of the pamphlet referred to, and even within the last few weeks, great reductions have been made in the charges of several of the great trunk lines.

£31,000 at 5 per cent. requires	£1,550	per mile per annum.
Other fixed charges (as before)................................	130	,, ,,
Total charge required per mile per annum to produce 5 per cent. interest	£1,680	,, ,,
The same at 10 per cent. on £31,000 =	£3,100	,, ,,
Other fixed charges	130	,, ,,
Total	£3,230	,, ,,

To be equally divided, for the reason before adduced—

Return required from the GOODS traffic.... {at 5 per cent. £840
{at 10 per cent..... £1,615
,, ,, PASSENGER do. {at 5 per cent. £840
{at 10 per cent..... £1,615

Table showing the diminution in the cost of Carriage per Ton per Mile, consequent on the Increase in the Traffic. (Original Cost of Construction £31,000 per Mile.)

Allowing Interest at the rate of 5 per cent. per Annum on the Capital.				Allowing Interest at the rate of 10 per cent. per Annum on the Capital.			
Average Traffic per Mile per Annum. Tons Net.	Fixed Charge per Ton per Mile for Interest.	Actual Working Charge per Ton per Mile.	Total Charge.	Fixed Charge per Ton per Mile for Interest.	Actual Working Charge per Ton per Mile.	Total Charge.	Average Traffic per Mile per Annum. Tons Net.
	d.	*d.*	*d.*	*d.*	*d.*	*d.*	
20,000	10·08	....	10·53	19·38	....	19·83	20,000
30,000	6·72	....	7·17	12·92	....	13·37	30,000
40,000	5·04	....	5·49	9·69	....	10·14	40,000
50,000	4·03	....	4·48	7·75	....	8·20	50,000
60,000	3·36	....	3·81	6·46	....	6·91	60,000
70,000	2·88	....	3·33	5·53	....	5·98	70,000
80,000	2·52	....	2·97	4·84	....	5·29	80,000
90,000	2·24	·45	2·69	4·31	·45	4·76	90,000
100,000	2·02	....	2·47	3·87	....	4·32	100,000
150,000	1·34	....	1·79	2·55	....	3·00	150,000
200,000	1·01	....	1·46	1·93	....	2·38	200,000
300,000	·67	....	1·12	1·29	....	1·74	300,000
400,000	·50	....	·95	·96	....	1·41	400,000
500,000	·40	....	·85	·77	....	1·22	500,000
1,000,000	·20	....	·65	·38	....	·83	1,000,000

In the above table, I have taken the working charge per ton per mile of goods at ·45*d.*, the same as the Belgian experience. I believe that the greater cheapness of coke in this country, and the superior mechanical skill, must reduce the actual locomotive expenses much below those of Belgium. But against that may be set the taxes and rates, and other charges, from which railways in Belgium are exempt—as also the greater speed kept up in this country.

Looking to the application of the preceding tables to a few examples, it appears that, taking the average cost of construction at £31,000 per mile, and allowing 10 per cent. interest on the capital expended, and assuming also the fixed expenses to be equally divided between the goods and passenger traffic, while a line with a traffic of 90,000 tons per mile per annum should charge on the average per ton per mile 4·76*d.*, a line with a traffic of 150,000 tons per mile per annum (nearly that of the Paris and Orleans Railway) could carry with equal profit to the shareholders, at 3*d.* per ton per mile. A line with the traffic of 300,000 tons per mile per annum (about that of the Manchester and Leeds) could carry with equal profit to the shareholders, at 1·74*d.* per ton per mile; while a line with a traffic of 750,000 tons per mile per annum (nearly I believe that of the Liverpool and Manchester) could carry, with equal profit to the shareholders, at the rate of about 1*d.* per ton per mile.

It has always appeared to me extraordinary, that the main trunk lines of England should hitherto have conveyed so small an amount of merchandise. The Paris and Orleans line, so lately opened throughout its entire length, carried last year, of grain and flour alone, 50,000 tons per mile, being for this one description of goods more than the average tonnage on all descriptions of goods in Belgium, a country pre-eminent as one for transit.

Referring to the table of the actual charge on the lines in England (p. 109), I find that the average charge per mile per ton on the London and Birmingham varies from 3·2*d.* to 7·5*d.*; on the Manchester and Leeds, from 4*d.* to 8*d.*; on the Liverpool and Manchester, from 2·9*d.* to 5·4*d.* The average charge by the table for the first would be about 1·22*d.*; for the second, 1·74*d.*; for the third, 1·00*d.*, assuming 10 per cent. interest on a cost of £31,000 per mile.

The extension of the benefits of railway conveyance to all agricultural produce, not having kept pace with their application to other interests, I think it will appear that the high charges have contributed to that result. To illustrate this subject, I have prepared tables of the various remunerative prices for the conveyance of cattle, sheep, horses, &c.

3 Fat Bullocks weigh on the average 1 ton.
A fat bullock travels on the average upon a common road, in one day, 15 miles,
And costs when so travelling, per day, 1*s.*, or ·8*d.* per mile.

5½ Lean Bullocks weigh, on the average, 1 ton.
They travel on a common road, on the average, from 15 to 20 miles a day, say 17 miles.
Their cost varies much, according to the period of the year, but it may be taken at an average of 3*s.* 6*d.* per 100 miles, say ½*d.* per mile.

On the average, there are 4 ordinary Horses to 1 ton,
Travelling from 14 to 20 miles per day, say on an average 17 miles,
Costing, when travelling on a common road, per day, 4*s.*,
Or say per mile, 2·9*d.*

20 Fat Sheep weigh, on the average, 1 ton,
And fat sheep travel on a common road, on the average, 10 to 12 miles a day, say 11 miles,
Costing per day per score*, 6*d.*,
Or per mile, about ½*d.*

16 Pigs, on the average, weigh 1 ton,
Travel on the common road about 12 miles per day,
Costing per day per score*, 9*d.*,
Being per mile per score, ¾*d.*

With these elements I have prepared the following tables, shewing the varying remunerative charges required per head of cattle, &c., according to the total yearly amount of tonnage per mile, and adapted to the various conditions—

1st, of a per centage on the capital of 5 per cent. and 10 per cent. per annum.

2ndly, of an original cost for construction of £18,000 and of £31,000 per mile.

It is notorious that hitherto, on the majority of the railways terminating in the metropolis or in large towns, the conveyance of cattle, sheep, calves, pigs, &c., for great distances, has been exceedingly small, and thus one of the advantages of railway communication in equalizing the price of provisions is lost.

The table shewing the cost of carriage of this class of traffic, with £31,000 per mile for construction, and 10 per cent. thereon interest, (see page 114),

	Per Fat Bullock per Mile.
Gives a charge for 90,000 tons per mile per annum	1·59*d.*
With a traffic of 150,000 tons (the Paris and Orleans traffic), of	1·00*d.*
With a traffic of 300,000 tons (that of the Manchester and Leeds), of	·58*d.*
And with a traffic of 750,000 tons (that of the Liverpool and Manchester), of	·30*d.*

Now I have stated before that the cost of sending a fat bullock by the common road is $\frac{8}{10}$*d.* per mile. If, therefore, a railway was to convey fat bullocks at a charge of, say $\frac{6}{10}$*d.* per mile, being the remunerating charge for an amount of traffic equal to that of the Manchester and Leeds Railway, it would engross to itself all this class of carriage, and hold out a positive inducement to divert the beasts or cattle from other channels by the superior advantages peculiar to railway transit. For it is well known that fat beasts or sheep or pigs lose much of their weight by travelling on the common road.

Referring to the same table, and taking, as before made out, the cost of a lean bullock at ½*d.* per mile, on the common road, we find the turning point at which the railway can with profit convey these, and beat the common road, is when the total traffic is about 200,000 tons per mile per annum.

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* I have found considerable difficulty in obtaining that which might be considered as a fair average cost per day per score, the prices differing so widely according to season, locality, breed, &c. I would observe, therefore, in reference to these two estimates, that, if they be found inapplicable to any particular locality, the tabular results founded on them may easily be modified to suit the exact cost that may be ascertained for the district to which the comparison is to be applied.

Tables showing the Diminution in the Cost of Carriage per Head of Cattle, &c., dependent on the Increase in the Traffic.

Original Cost of Construction £18,000 per Mile.

Allowing interest at the rate of 5 per cent. per Annum on the Capital.

Average Traffic per Mile per Annum.	Cost per mile					
	Per Ton.	Per fat Bullock.	Per lean Bullock.	Per Horse.	Per Score of fat Sheep.	Per Score of Pigs.
Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
20,000	6·63	2·21	1·21	1·66	6·63	8·27
30,000	4·57	1·52	·83	1·14	4·57	5·71
40,000	3·54	1·18	·64	·88	3·54	4·43
50,000	2·92	·97	·53	·73	2·92	3·65
60,000	2·51	·84	·46	·63	2·51	3·14
70,000	2·21	·74	·40	·55	2·21	2·76
80,000	1·99	·66	·36	·49	1·99	2·49
90,000	1·82	·61	·33	·45	1·82	2·27
100,000	1·69	·56	·31	·42	1·69	2·11
150,000	1·27	·42	·23	·32	1·27	1·59
200,000	1·07	·36	·19	·28	1·07	1·34
300,000	·86	·28	·15	·22	·86	1·08
400,000	·76	·25	·14	·19	·76	·95
500,000	·70	·23	·12	·17	·70	·87
1,000,000	·57	·19	·10	·14	·57	·71

Allowing interest at the rate of 10 per cent. per Annum on the Capital.

Average Traffic per Mile per Annum.	Cost per mile					
	Per Ton.	Per fat Bullock.	Per lean Bullock.	Per Horse	Per Score of fat Sheep.	Per Score of Pigs.
Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
20,000	12·03	4·01	2·19	3·01	12·03	15·04
30,000	8·17	2·72	1·49	2·04	8·17	10·21
40,000	6·24	2·08	1·13	1·56	6·24	7·80
50,000	5·08	1·69	·92	1·27	5·08	6·35
60,000	4·31	1·44	·79	1·07	4·31	5·39
70,000	3·76	1·25	·68	·94	3·76	4·70
80,000	3·34	1·11	·61	·83	3·34	4·17
90,000	3.01	1·00	·55	·75	3·01	3·76
100,000	2·77	·92	·50	·69	2·77	3·46
150,000	1·99	·66	·36	·49	1·99	2·49
200,000	1·61	·54	·29	·40	1·61	2·01
300,000	1·22	·41	·22	·31	1·22	1·53
400,000	1·03	·34	·19	·26	1·03	1·29
500,000	·91	·30	·16	·23	·91	1·14
1,000,000	·68	·23	·12	·17	·68	·85

Original Cost of Construction, £31,000 per Mile.

Allowing interest at the rate of 5 per cent. per Annum on the Capital.							Allowing interest at the rate of 10 per cent. per Annum on the Capital.						
Average Traffic per Mile per Annum.	Cost per mile						Average Traffic per Mile per Annum.	Cost per mile.					
	Per Ton.	Per fat Bullock.	Per lean Bullock.	Per Horse.	Per Score of fat Sheep.	Per Score of Pigs.		Per Ton.	Per fat Bullock.	Per lean Bullock.	Per Horse.	Per Score of fat Sheep.	Per Score of Pigs.
Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
20,000	10·53	3·51	1·91	2·64	10·53	13·16	20,000	19·83	6·61	3·60	4·96	19·83	24·79
30,000	7·17	2·72	1·30	1·74	7·17	8·96	30,000	13·37	4·45	2·43	3·35	13·37	17·81
40,000	5·49	1·83	1·00	1·37	5·49	6·86	40,000	10·14	3·38	1·75	2·54	10·14	12·67
50,000	4·48	1·39	·81	1·12	4·48	5·50	50,000	8·20	2·73	1·50	2·05	8·20	10·25
60,000	3·81	1·27	·70	·95	3·81	4·76	60,000	6·91	2·30	1·26	1·73	6·91	8·64
70,000	3·33	1·11	·60	·83	3·33	4·17	70,000	5·98	1·99	1·09	1·49	5·98	7·47
80,000	2·97	·99	·54	·74	2·97	3·71	80,000	5·29	1·76	·96	1·32	5·29	6·63
90,000	2·69	·89	·49	·66	2·69	3·36	90,000	4·76	1·59	·86	1·19	4·76	5·95
100,000	2·47	·82	·45	·62	2·47	3·09	100,000	4·32	1·44	·79	1·08	4·32	5·40
150,000	1·79	·59	·32	·45	1·79	2·29	150,000	3·00	1·00	·55	·75	3·00	3·75
200,000	1·46	·48	·27	·36	1·46	1·82	200,000	2·38	·79	·43	·59	2·38	2·97
300,000	1·12	·37	·20	·28	1·12	1·40	300,000	1·74	·58	·31	·43	1·74	2·17
400,000	·95	·32	·17	·24	·95	1·19	400,000	1·41	·47	·26	·35	1·41	1·76
500,000	·85	·28	·15	·21	·85	1·06	500,000	1·22	·31	·22	·31	1·22	1·53
1,000,000	·65	·22	·12	·16	·65	·81	1,000,000	·83	·28	·15	·21	·83	1·04

So with a horse, the cost of which on the common road averages, per mile, nearly 3*d.*, the turning point in the scale or table is an aggregate goods traffic per mile per annum of about 40,000 tons.

The following tables bringing in juxta-position the comparative cost by railway and by the common road for each class of cattle, horses, sheep, &c., enable the reader to find at a glance the aggregate amount of traffic required to produce the turning point at which the railways can convey with profit at rates cheaper than common roads.

Thus, with an original cost of £18,000 per mile, and interest on the capital at 5 per cent., the turning point with fat bullocks is at or about an aggregate yearly tonnage per mile of 65,000 tons; with lean bullocks, of 55,000 tons; or with an original cost per mile of £31,000, and interest thereon at the rate of 10 per cent. per annum (see page 117), the turning point with fat bullocks is at or about an aggregate yearly tonnage per mile of 200,000 tons; with lean bullocks, of about 175,000 tons.

Original Cost of Construction £18,000 per Mile.

Allowing Interest at the rate of 5 per cent. per Annum.

Average Traffic per Mile per Annum.	Fat Bullocks, 3 to 1 ton.		Lean Bullocks, 5½ to 1 ton.		Horses, 4 to 1 ton.		Sheep, 20 to 1 ton.		Pigs, 16 to 1 ton.	
	Cost per mile per head.		Cost per mile per head.		Cost per mile per head.		Cost per mile per score.		Cost per mile per score.	
	By Rail-way.	By common Road	By Rail-way.	By common Road.	By Rail-way.	By common Road.	By Rail-way.	By common Road.	By Rail-way.	By common Road.
Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
20,000	2·21	....	1·21	....	1·66	....	6·63	....	8·27	
30,000	1·52	....	·83	....	1·14	....	4·57	....	5·71	
40,000	1·18	....	·64	....	·88	....	3·54	....	4·43	
50,000	·97	....	·53	....	·73	....	2·92	....	3·65	
60,000	·84	....	·46	....	·63	....	2·51	....	3·14	
70,000	·74	....	·40	....	·55	....	2·21	....	2·76	
80,000	·66	·8	·36	·50	·49	2·9	1·99	6·0	2·49	9·0
90,000	·61	....	·33	....	·45	....	1·82	....	2·27	
100,000	·56	....	·31	....	·42	....	1·69	....	2·11	
150,000	·42	....	·23	....	·32	....	1·27	....	1·59	
200,000	·36	....	·19	....	·28	....	1·07	....	1·34	
300,000	·28	....	·15	....	·22	....	·86	....	1·08	
400,000	·25	....	·14	....	·19	....	·76	....	·95	
500,000	·23	....	·12	....	·17	....	·70	....	·87	
1,000,000	·19	....	·10	....	·14	....	·57	....	·71	

Original Cost of Construction £18,000 *per Mile.*

Allowing Interest at the rate of 10 per cent. per Annum.

Average Traffic per Mile per Annum.	Fat Bullocks, 3 to 1 ton.		Lean Bullocks, 5½ to 1 ton.		Horses, 4 to 1 ton.		Sheep, 20 to 1 ton.		Pigs, 16 to 1 ton.	
	Cost per mile per head.		Cost per mile per head.		Cost per mile per head.		Cost per mile per score.		Cost per mile per score.	
	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.
Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
20,000	4·01	....	2·19	....	3·01	....	12·03	....	15·08	
30,000	2·72	....	1·49	....	2·04	....	8·17	....	10·21	
40,000	2·08	....	1·13	....	1·56	....	6·24	....	7·80	
50,000	1·69	....	·92	....	1·27	....	5·08	....	6·35	
60,000	1·44	....	·79	....	1·07	....	4·31	....	5·39	
70,000	1·25	....	·68	....	·94	....	3·76	....	4·70	
80,000	1·11	....	·61	....	·83	....	3·34	....	4·17	
90,000	1·00	....	·55	....	·75	....	3·01	....	3·76	
100,000	·92	·8	·50	·50	·69	2·9	2·77	6·0	3·46	9·0
150,000	·66	....	·36	....	·49	....	1·99	....	2·49	
200,000	·54	....	·29	....	·40	....	1·61	....	2·01	
300,000	·41	....	·22	....	·31	....	1·22	....	1·53	
400,000	·34	....	·19	....	·26	....	1·03	....	1·29	
500,000	·30	....	·16	....	·23	....	·91	....	1·14	
1,000,000	·23	....	·12	....	·17	....	·68	....	·85	

Original Cost of Construction £31,000 *per Mile.*

Allowing Interest at the rate of 5 per cent. per Annum.

Average Traffic per Mile per Annum.	Fat Bullocks, 3 to 1 ton.		Lean Bullocks, 5½ to 1 ton.		Horses, 4 to 1 ton.		Sheep, 20 to 1 ton.		Pigs, 16 to 1 ton.	
	Cost per mile per head.		Cost per mile per head.		Cost per mile per head.		Cost per mile per score.		Cost per mile per score.	
	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.
Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
20,000	3·51	....	1·91	....	2·64	....	10·53	....	13·16	
30,000	2·72	....	1·30	....	1·74	....	7·17	....	8·96	
40,000	1·83	....	1·00	....	1·37	....	5·49	....	6·86	
50,000	1·39	....	·81	....	1·12	....	4·48	....	5·50	
60,000	1·27	....	·70	....	·95	....	3·81	....	4·76	
70,000	1·11	....	·60	....	·83	....	3·33	....	4·17	
80,000	·99	....	·54	....	·74	....	2·97	....	3·71	
90,000	·89	·8	·49	·50	·66	2·9	2·69	6·0	3·36	9·0
100,000	·84	....	·45	....	·62	....	2·47	....	3·09	
150,000	·59	....	·32	....	·45	....	1·79	....	2.29	
200,000	·48	....	·27	....	·36	....	1·46	....	1·82	
300,000	·37	....	·20	....	·28	....	1·12	....	1·40	
400,000	·32	....	·17	....	·24	....	·95	....	1·19	
500,000	·28	....	·15	....	·21	....	·85	....	1·06	
1,000,000	·22	....	·12	....	·16	....	·65	....	·81	

Original Cost of Construction £31,000 per Mile.

Allowing Interest at the rate of 10 per cent. per Annum.

Average Traffic per Mile per Annum.	Fat Bullocks, 3 to 1 ton.		Lean Bullocks, 5½ to 1 ton.		Horses, 4 to 1 ton.		Sheep, 20 to 1 ton.		Pigs, 16 to 1 ton.	
	Cost per mile per head.		Cost per mile per head.		Cost per mile per head.		Cost per mile per score.		Cost per mile per score.	
	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.	By Railway.	By common Road.
Tons Net.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
20,000	6·61	....	3·60	....	4·96	....	19·83	....	24·79	
30,000	4·45	....	2·43	....	3·35	....	13·37	....	17·81	
40,000	3·38	....	1·75	....	2·54	....	10·14	....	12·67	
50,000	2·73	....	1·50	....	2·05	....	8·20	....	10·25	
60,000	2·30	....	1·26	....	1·73	....	6·91	....	8·64	
70,000	1·99	....	1·09	....	1·49	....	5·98	....	7·47	
80,000	1·76	....	·96	....	1·32	....	5·29	....	6·63	
90,000	1·59	·8	·86	·5	1·19	2·9	4·76	6·0	5·95	9·0
100,000	1·44	....	·79	....	1·08	....	4·32	....	5·40	
150,000	1·00	....	·55	....	·75	....	3·00	....	3·75	
200,000	·79	....	·43	....	·59	....	2·38	....	2·97	
300,000	·58	....	·31	....	·43	....	1·74	....	2·17	
400,000	·47	....	·26	....	·35	....	1·41	....	1·76	
500,000	·31	....	·22	....	·31	....	1·22	....	1·53	
1,000,000	·28	....	·15	....	·21	....	·83	....	1·04	

Tables similar to the preceding, prepared with a view to show the comparative cost at which railways and canals could afford to carry various classes of goods, would be exceedingly useful. They would demonstrate that with a sufficient amount of traffic approaching, for example, to that of the Liverpool and Manchester, or about that of the Manchester and Leeds railways can convey, with remunerative rates, at fares lower than canals. And when this comparative cheapness is taken into account jointly with the other advantages of speed and regularity in the transit, it becomes manifest that wherever there is much movement in the conveyance of goods, railways must take the lead.

Carriage of Parcels.

Before leaving this part of the subject, I am desirous to advert to the question of the conveyance of parcels. I had prepared the details of some facts to be submitted to the Society, tending to show many practical inconveniences in addition to the drawback of expense, to which might be in part attributed the small amount of traffic obtained by railways in the carriage of parcels. But the following statement, published in a morning paper* of the 11th instant, by showing an important movement in the right direction, will render the production of some of these statements unnecessary. It is besides more pleasing to record improvements than indicate defects.

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* "Morning Chronicle," 11th March, 1846.

"The Manchester and Leeds Railway Company's Report, presented by the Directors to the Proprietors on Wednesday last, stated that the principle of low fixed rates, irrespective of distance, had been applied to the carriage and delivery of parcels, not only on their own line, but also on neighbouring lines. On Monday last, at a meeting of the Trent Valley Railway Company, Mr. Edward Tootal stated that on the series of lines connecting Manchester and Liverpool with Birmingham and London, combining the London and Birmingham Grand Junction, Manchester and Birmingham, and Trent Valley Lines, in future to be under the management of an amalgamated and consolidated Company, under the title of the London and North Western Railway Company (possessing a capital of fourteen millions sterling), all parcels under 12lb. weight would be carried from one end to the other, and to all intermediate places, at the uniform charge of 1*s.*; and that this plan was ultimately to be extended to all the lines between Falmouth and Dover at the south, and Glasgow at the north."

Hitherto parcels were charged various rates, not only according to the distance, but according to the train by which they were dispatched, and it was an irksome thing to remember the proper time for sending them at the lower rates, and to calculate the expense according to the distance. This expense was so great, that in the case of small parcels, the bulk of which admitted of being separated into several, so as to bring these within the weight required by the Post Office regulations, it had become a very general practice to take the channel of the Post Office in preference to the direct railway conveyance.

So far, therefore, this is a very great improvement both as regards the uniformity in the charge and the reduction in its amount. I have not the data with reference to parcels requisite for the formation of tables similar to those previously submitted with reference to other kinds of traffic; but in the absence of these, I would simply refer to the great experiment of Post Office reform, and the success of the Metropolitan Parcel Delivery Companies, to support my belief that such an arrangement, if it extended the reduction still further to 6*d.* per parcel, or even to 3*d.*, would prove equally, if not more remunerative.

Viewing the question of the delivery of parcels as respects regularity and economy, it is probable that the Post Office authorities, by having the distributary apparatus ready at their hands, and already adapted for this special service, could accommodate the public at rates lower than separate Companies, all requiring to incur the expense of separate management. It behoves the Companies, therefore, if they wish to retain this source of traffic under their own controul, without any intermediate agency, to make the charges so low that there shall arise no public or general desire that it should be confided to the Post Office.

Passenger Traffic.

Before concluding these observations, it will be useful to extend the same reasoning to the consideration of the passenger traffic. I believe, especially with regard to the *conveyance of goods*, that it is important to direct attention to the encouragement that may be given to its increase by a lowering of fares. With respect to passenger traffic much has already been accomplished to reduce the tolls to a low charge; but it is believed that Companies destined to accommodate populous neighbourhoods may, with benefit, carry their system of reduction still further.

The Gauge Commissioners' Report gives at 46½ tons, exclusive of engine and tender, the total weight of a train capable of containing 126 first-class passengers, being thus composed, viz.

7 carriages weighing about	34 tons.
126 first class passengers with their luggage	12½ ,,
Total load	46½

or, in round numbers, three first-class passengers to a ton gross weight; taking, however, the mean for all passengers, the number per gross ton will of course be more; I assume it at six passengers per ton gross.

Now in the preceding tables (pp. 107 and 110), the charge per ton per mile is the return per ton net, made up first of a fixed charge for interest, &c., determined by the tonnage, and a constant addition of ·45*d.* per ton per mile deduced from the experience of the Belgian Railways. The working expenses of a passenger train per ton per mile are considerably greater than those for the conveyance of goods, owing to the greater speed, expense of plant, class of officers, &c.

The average working of nine years on the Belgian railways gives the cost per ton per mile for passenger trains at $1\frac{2}{10}$*d.*; and although the difference of speed might lead to the supposition, that the cost would be less on the Belgian than on the English railways, the greater skill of the English engineers and managers, and the greater cheapness of coke must, I have no doubt, enable them to work at their higher speed with an economy equal to that of the Belgian railways, even including the passenger tax; I assume, therefore, in the following tables 1·2*d.* as the cost per ton per mile of passenger trains.

An inspection of the following tables (pp. 120 and 121) shows of how great importance it is to the public, that the traffic per line should be great.

	d.
Taking the cost at £31,000 per mile, and allowing 10 per cent. interest on the capital, we find that a line with an average number of passengers of 120,000 per mile per annum should charge per mile per passenger, on the average	3·86
While a line with the traffic of the Manchester and Leeds (about 650,000 passengers per mile per annum,) may charge	0·9
A line with the traffic of the London and Birmingham, (viz., about 700,000 per mile per annum)	0·85
With a traffic of 1¼ million (Paris and Orleans)	0·52
Do. 1½ ,, (London and Greenwich)	0·50
Do. 3 ,, (London and Blackwall, Qy ?)	0·33
The actual charges on the London and Birmingham were in 1844 per mile per passenger	2·609
In 1845 they were reduced to	1·818

By this important reduction, the public benefited to the amount of many thousands, the increase in the number of passengers having been in 1845 fifty-seven per cent., (or for the half-year as 222,000 is to 346,000*.)

* In the Report of the Parliamentary proceedings of the 19th March, 1846, it is stated that the London and Birmingham, Grand Junction, and other amalgamated companies propose to reduce their charges still more, that is to say, to 2*d.* per mile per 1st class, 1½*d.* per mile per 2nd class, and 1*d.* per mile per 3rd class passenger.

Table showing the Diminution in the Cost of Carriage per Passenger, dependent on the Increase of the Traffic.

Original Cost of Construction, £18,000 per Mile.

Allowing Interest at the rate of 5 per cent. per Annum on the Capital.						Allowing Interest at the rate of 10 per cent. per annum on the Capital.					
Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 6 to 1 Ton gross.	Per Ton gross per mile.			Charge per Passenger per Mile.	Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 6 to 1 Ton gross.	Per Ton gross per mile.			Charge per Passenger per Mile.
		Fixed Charge for Interest, &c.	Actual working Expenses.	Total Charge,				Fixed Charge for Interest, &c.	Actual working Expenses.	Total Charge.	
		d.	*d.*	*d.*	*d.*			*d.*	*d.*	*d.*	*d.*
20,000	120,000	6·18	....	7·38	1·23	20,000	120,000	11·58	....	12·78	2·13
30,000	180,000	4·12	....	5·32	·89	30,000	180,000	7·27	....	8·92	1·49
40,000	240,000	3·09	....	4·29	·71	40,000	240,000	5·79	....	6·99	1·16
50,000	300,000	2·47	....	3·67	·61	50,000	300,000	4·63	....	5·83	·97
60,000	360,000	2·06	....	3·26	·54	60,000	360,000	3·86	....	5·06	·84
70,000	420,000	1·76	....	2·96	·49	70,000	420,000	3·31	....	4·51	·75
80,000	480,000	1·54	....	2·74	·46	80,000	480,000	2·89	....	4·09	·68
90,000	540,000	1·37	1·20	2·57	·43	90,000	540,000	2·56	1·20	3·76	·62
100,000	600,000	1·24	....	2·44	·41	100,000	600,000	2·32	....	3·52	·58
150,000	900,000	·82	....	2·02	·34	150,000	900,000	1·54	....	2·74	·46
200,000	1,200,000	·62	....	1·82	·30	200,000	1,200,000	1·16	....	2·36	·39
300,000	1,800,000	·41	....	1·61	·27	300,000	1,800,000	·77	....	1·97	·33
400,000	2,400,000	·31	....	1·51	·25	400,000	2,400,000	·58	....	1·78	·29
500,000	3,000,000	·25	....	1·45	·24	500,000	3,000,000	·46	....	1·66	·28
1,000,000	6,000,000	·12	....	1·32	·22	1,000,000	6,000,000	·23	....	1·43	·24

Original Cost of Construction, £31,000 per Mile.

Allowing Interest at the rate of 5 per cent. per Annum on the Capital.						Allowing Interest at the rate of 10 per cent. per Annum on the Capital.					
Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 6 to 1 Ton gross.	Per Ton gross per Mile.			Charge per Passenger per Mile.	Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 6 to 1 Ton gross.	Per Ton gross per Mile.			Charge per Passenger per Mile.
		Fixed Charge for Interest, &c.	Actual working Expenses,	Total Charge.				Fixed Charge for Interest, &c.	Actual working Expenses.	Total Charge.	
		d.	*d.*	*d.*	*d.*			*d.*	*d.*	*d.*	*d.*
20,000	120,000	10·08	....	11·28	1·88	20,000	120,000	19·38	....	20·58	3·86
30,000	180,000	6·72	....	7·92	1·32	30,000	180,000	12·92	....	14·12	2·35
40,000	240,000	5·04	....	6·24	1·04	40,000	240,000	9·69	....	10·89	1·81
50,000	300,000	4·03	....	5·23	·87	50,000	300,000	7·75	....	8·95	1·49
60,000	360,000	3·36	....	4·56	·76	60,000	360,000	6·46	....	7·66	1·28
70,000	420,000	2·88	....	3·98	·66	70,000	420,000	5·53	....	6·73	1·12
80,000	480,000	2·52	....	3·62	·60	80,000	480,000	4·84	....	6·04	1·00
90,000	540,000	2·24	1·20	3·34	·56	90,000	540,000	4·31	1·20	5·51	·92
100,000	600,000	2·02	....	3·22	·54	100,000	600,000	3·87	....	5·07	·84
150,000	900,000	1·34	....	2·54	·42	150,000	900,000	2·55	....	3·75	·63
200,000	1,200,000	1·01	....	2·21	·35	200,000	1,200,000	1·93	....	3·13	·52
300,000	1,800,000	·67	....	1·87	·31	300,000	1,800,000	1·29	....	2·49	·41
400,000	2,400,000	·50	....	1·70	·28	400,000	2,400,000	·96	....	2·16	·36
500,000	3,000,000	·40	....	1·60	·27	500,000	3,000,000	·77	....	1·97	·33
1,000,000	6,000,000	·20	....	1·40	·23	1,000,000	6,000,000	·38	....	1·58	·26

Without pursuing these illustrations into further detail, I conclude from them that the public and the Companies are both highly benefited by a large concourse of goods or passenger traffic on any one line, provided that the managers of such line are alive to the advantages to themselves of encouraging the influx of traffic, by extraordinary reductions on tolls and fares. Referring to actual results, such of the great Companies as have tried the experiment of low fares, have found their receipts increased. The London and Birmingham and Grand Junction, the Great Western, the South Eastern, the Brighton, and others have reduced their fares for passengers, and by return tickets, season tickets, and other means, rendered the travelling much less expensive. They have likewise made great reductions in their charges for goods, and the result has been a profit by the change. The reductions, however, have as yet only been applied timidly, and not to the extent required to give fair play to the principle. Hence we still see, on the majority of the lines, and we indeed see it officially reported, that their trains do not travel half or a quarter full. There is, of course, a limit to this *profitable* reduction, but I believe it has not yet been attained on the great lines. On short lines the working expenses are proportionally so much greater, that the limit with them will generally be (*cæteris paribus*) at a higher standard.

I have shown, with regard to goods, that in Belgium, while the canals carried on the average 400,000 tons of goods per mile per annum, the railways, owing to their high charges and want of proper accommodation for the goods traffic, carried only 40,000 tons.

Now there is no doubt that the railways can carry at as cheap a rate as the canals, and that they offer superior advantages, which ought to give them the preference without any chance of competition from canals. I attribute this inconsistency between actual results, and results that ought to be, to the neglect of an important branch of railway accommodation.

As regards the passenger traffic, I conceive that on those lines where we now see a return of the conveyance of 1,000,000 passengers per mile per annum, we shall soon see returns of double or treble that amount*. There are railways now considering the propriety of contracting for the daily conveyance of artisans to and from their abodes near the metropolis to their places of work, at rates so low, that the rent of their houses in the country, supplied with every requisite, added to the cost of their conveyance by railway morning and evening, will be less than the rents which they pay for the miserable hovels in which they now reside.

I introduce this topic for the sake of drawing attention to an important principle enunciated in some observations which I shall quote, viz., that the conveyance of the masses, *i. e.*, of third class passengers, should have a close relation to the cost of conveyance of goods, weight for weight. More room and better accommodation must be afforded them; but as a set-off to the additional expense incurred on that score, there is a great saving in the time and cost of loading and unloading. In order to adhere throughout this essay to a purely statistical character, I designedly avoid entering into the general question which is here incidentally referred to.

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* 47,778 passengers are stated to have been conveyed in a single day from the London Bridge Station of the South Eastern Railway.

I quote the following passage from the report of the speech of the Chairman of the London and Croydon Railway Company, at a general meeting of the shareholders held on the 10th of this month*. The Chairman stated that "an Association had been recently established in London for improving the dwellings of the working classes. A very intelligent member of that Association considered that it would be an error of judgment to improve the habitations in London, and had repeatedly urged the erection of suitable tenements within five or six miles of London, in order that they and their families might enjoy the pure air of the country. He considered further, that this plan might be effectually carried out by the means of railways, and a proposal had been made to the Board by an eminent architect, who, in his zeal for the industrious classes, proposed to construct a railway for the purpose of carrying out his plan with greater effect. But, in the first instance, he came to the Directors to ascertain if they would take these people home and back again at a cheap rate. And he considered that they might effect the desired object if they could carry these people as if they were goods, and at as cheap a rate as goods were conveyed. He saw no reason why they should not accept the proposition, and bring an additional amount of traffic on their line, thus increasing their profits, and conferring great advantages on the industrious classes of the community, by removing them from the moral and physical effluvium generated in all large and densely-populated cities, afford them better houses, better water, better lighting, and in short, almost a change of existence."

Now, if such an arrangement as this were carried out, and believing that in a commercial or a financial point of view, it will be to the interest of metropolitan railways, and all railways generally terminating in very populous towns, to facilitate the carrying out of any arrangements which will have the effect of making their railway accessible to the great masses—infinitely small profits *multiplied by millions* will, in a public and private point of view, be better than large profits *multiplied by thousands*, or perhaps only *hundreds*. To carry out any such arrangement as is here contemplated, of course the utmost economy consistent with safety and protection from the weather would be studied. The first item of saving would be by a diminution in the speed (perhaps not exceeding 20 miles an hour), whereby considerable reduction would be made in the working charges—also the number of passengers per ton would be more than the previous average taken, which comprised in the data the weight for the accommodation of first-class passengers.

In the annexed tables (pp. 124 and 125) I have illustrated this subject of an economical and profitable conveyance of numbers brought to the utmost limit. In goods trains properly loaded, the average net weight to the gross weight is about $\frac{1}{2}$, or as one ton net to two tons gross. The same proportion of net to gross weight would hold for the conveyance of passengers for the purposes just explained, and we should thus have to every two tons gross weight fifteen passengers conveyed.

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* "Morning Chronicle," 11th March, 1846.

Table showing the Diminution in the Cost of Carriage per Passenger, dependent on the Increase of the Traffic.

(*Special Illustration adapted to the conveyance of great numbers as explained in preceding pages* 122 *and* 123 *of the text.*)

Original Cost of Construction £18,000 per Mile.

Allowing Interest at the rate of 5 per cent. per Annum on the Capital Expended.						Allowing Interest at the rate of 10 per cent. per Annum on the Capital Expended.					
Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 7½ to 1 Ton gross.	Per Ton gross per Mile.			Charge per Passenger per Mile.	Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 7½ to 1 Ton gross.	Per Ton gross per Mile.			Charge per Passenger per Mile.
		Fixed Charge for Interest, &c.	Actual working Expenses.	Total Charge.				Fixed Charge for Interest, &c.	Actual working Expenses.	Total Charge.	
		d.	*d.*	*d.*	*d.*			*d.*	*d.*	*d.*	*d.*
20,000	150,000	6·18	....	6·41	·86	20,000	150,000	11·58	....	11·81	1·57
30,000	215,000	4·12	....	4·35	·58	30,000	215,000	7·72	....	7·95	1·04
40,000	300,000	3·09	....	3·32	·45	40,000	300,000	5·79	....	6·02	·80
50,000	375,000	2·47	....	2·70	·36	50,000	375,000	4·63	....	4·86	·65
60,000	450,000	2·06	....	2·29	·31	60,000	450,000	3·86	....	4·09	·55
70,000	525,000	1·76	....	1·99	·27	70,000	525,000	3·31	....	3·54	·47
80,000	600,000	1·54	·23	1·77	·24	80,000	600,000	2·89	....	3·12	·42
90,000	675,000	1·37	....	1·60	·21	90,000	675,000	2·56	·23	2·79	·37
100,000	750,000	1·24	....	1·47	·19	100,000	750,000	2·32	....	2·55	·34
150,000	1,125,000	·82	....	1·05	·16	150,000	1,125,000	1·54	....	1·77	·24
200,000	1,500,000	·62	....	·85	·11	200,000	1,500,000	1·16	....	1·39	·19
300,000	2,250,000	·41	....	·65	·09	300,000	2,250,000	·77	....	1·00	·13
400,000	3,000,000	·31	....	·54	·07	400,000	3,000,000	·58	....	·81	·11
500,000	3,750,000	·25	....	·48	·06	500,000	3,750,000	·46	....	·69	·09

Original Cost of Construction, £31,000 per Mile.

Allowing Interest at the rate of 5 per cent. per Annum.						Allowing Interest at the rate of 10 per cent. per Annum.					
Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 7½ to 1 Ton gross.	Per Ton gross per Mile.			Charge per Passenger per Mile.	Average Passenger Traffic per Mile per Annum. Tons gross.	Average No. of Passengers corresponding to gross Tonnage. 7½ to 1 Ton gross.	Per Ton gross per Mile.			Charge per Passenger per Mile.
		Fixed Charge for Interest, &c.	Actual working Expenses.	Total Charge.				Fixed Charge for Interest, &c.	Actual working Expenses.	Total Charge.	
		d.	*d.*	*d.*	*d.*			*d.*	*d.*	*d.*	*d.*
20,000	150,000	10·08	....	10·31	1·37	20,000	150,000	19·38	....	19·61	2·61
30,000	215,000	6·72	....	6·95	·93	30,000	215,000	12·92	....	13·15	1·75
40,000	300,000	5·04	....	5·27	·70	40,000	300,000	9·69	....	9·92	1·32
50,000	375,000	4·03	....	4·26	·57	50,000	375,000	7·75	....	7·98	1·06
60,000	450,000	3·36	....	3·59	·48	60,000	450,000	6·46	....	6·69	·89
70,000	525,000	2·88	....	3·11	·42	70,000	525,000	5·53	....	5·76	·77
80,000	600,000	2·52	·23	2·75	·37	80,000	600,000	4·84	....	5·07	·67
90,000	675,000	2·24	....	2·47	·33	90,000	675,000	4·31	·23	4·54	·61
100,000	750,000	2·02	....	2·25	·30	100,000	750,000	3·87	....	4·10	·55
150,000	1,125,000	1·34	....	1·57	·21	150,000	1,125,000	2·55	....	2·78	·37
200,000	1,500,000	1·01	....	1·24	·17	200,000	1,500,000	1·93	....	2·16	·29
300,000	2,250,000	·67	....	·90	·12	300,000	2,250,000	1·29	....	1·52	·20
400,000	3,000,000	·50	....	·73	·10	400,000	3,000,000	·96	....	1·19	·16
500,000	3,750,000	·40	....	.63	·08	500,000	3,750,000	·77	....	1·00	·13

The average charge for working expenses was stated to be (p. 119) 1·2*d.* per mile per ton net on passenger trains generally. The lower speed for the accommodation of the passengers now considered, would reduce this charge considerably, in fact bring it to the ·45*d.* per ton net per mile, found to be the working cost of goods trains on the Belgian railways. Taking therefore ·23*d.* as the cost per ton gross, and applying the proportion above deduced of fifteen passengers to two tons gross weight, I have constructed the annexed tables, (pp. 124 and 125,) again as before divided into four classes, viz.:

1st. Two in relation to the costs of construction of £18,000 per mile, and £31,000 per mile.

2ndly. Two in relation to the interest on the capital of 5 per cent. per annum, also to the interest of 10 per cent. per annum.

Conclusions from preceding Analyses and Tabular Deductions.

Assuming that which from the past management of many of the English Railways, I am warranted in assuming, viz.: that an enlightened desire to meet the wants of the public as to economy, speed, and safety, will continue to be the ruling motive of the managers; it is clearly to the interest of the public that where hitherto 500,000 passengers have travelled, 1,000,000 should by reduced fares and increased accommodation be induced to travel in future;—and that where hitherto 500,000 tons of goods have been conveyed, a demand should be created by reducing the charges, for the conveyance of 1,000,000 tons.

But this important benefit cannot be obtained by the formation of directly competing lines, which must divide the traffic between them, and thus of necessity prevent that great reduction of tolls and fares which the tables show to be consistent only with increase of traffic.

By the same tables it appears that where the traffic is very large the original cost of the railway has an influence on the amount which it is necessary to charge by no means proportionate to the relative costs. For example, with an amount of passenger traffic corresponding to 500,000 tons per mile per annum, the expense of conveying a passenger is, with an original cost of £31,000, and an allowance of 10 per cent. interest thereon, ·13*d.* or $\frac{13}{100}$*d.*; whereas, with the original cost of £18,000, and a similar allowance of 10 per cent. interest, the cost of conveying a passenger is ·09*d.* or $\frac{9}{100}$*d.*

The same tables shew that with an average passenger traffic, corresponding to 40,000 tons per mile per annum, the remunerating charge at 10 per cent. interest, and £31,000 original cost per mile, is 1¾*d.* on the average.

And that with a passenger traffic corresponding to 500,000 tons per mile per annum, a charge of $\frac{13}{100}$*d.* would produce the same remuneration of 10 per cent. on the same original cost of £31,000 per mile.

But if railways are thus, for the advantage of the public, to convey great numbers of passengers and great quantities of merchandise, it is most important that no system be peremptorily and finally adopted which shall limit the powers of railways to give accommodation to that prospective increase of traffic. All railway systems ought to be eminently expansive; and to take what has been accomplished in the past as a criterion of what is to be accomplished in the future, nay, of that which the public will shortly demand, and to found any conclusion on such a narrow basis, would be most detrimental to the public interests. These demand from our engineers (and they will, I doubt not, satisfy the demand) increased power, increased speed, and increased economy.

Let us bear in mind that the railway system is but commenced; and looking at the great improvements which have been made in locomotives, enabling them to accomplish the conveyance of loads double those they could draw some years ago, let us be careful in adopting the present average speed and loads of passenger and other trains as the speed and loads that will be required some years hence by the public. Let us not devise our future works and arrangements with the idea of "finality" to cramp our exertions.

The traffic is not simply to be diverted from existing channels,—it is to be created by every encouragement of cheapness of transit, regularity, safety, adaptation to the wants of the public, and enlightened economy in the management and working.

These objects can only be fully attained by the cordial co-operation of all officers employed on railways; and all must be so remunerated as to be encouraged in making the strenuous efforts which are essential to introduce the improvements thus indicated.

Companies should themselves undertake (without mediators) the conveyance of goods. The communication ought to be direct between the great commercial and manufacturing public and the railway managers. Otherwise the bold reductions recommended in the carriage of goods would probably be attended by a loss, for they would not in all likelihood be met by corresponding reductions by carriers, and the public would not have the attraction of the very low fares so essential to secure great quantities. There are *defects* inherent in the practice of conveyance of goods by intermediate carriers which must of necessity act as a discouragement to the increase of traffic. For example, by the present system of sending merchandise through the instrumentality of carriers, intermediate stations in relation with the smaller towns do not afford them daily communication, because the carriers have not a sufficient amount of goods to load a truck for each day. If, on the contrary, the carriage of the goods were in the hands of the Company, inasmuch as the goods for each town would not be divided into as many loads as there may be carriers to that station, the delivery could be a daily one. Hence the public would have the advantage of a more exact service, and of greater dispatch, the effect of which would be an increase in the amount.

The payment of two managements, double profits, &c., must of course enhance the charges. The public interest, moreover, does not so quickly identify itself with that of private carriers as with that of great Companies, and does not act so quickly upon the former as upon the latter.

Considering the item of economy in the working expenses, chiefly in that part embraced under the head of locomotive expenses, viz., coke, oil, &c., the tables show that when the traffic is so great as to make the fixed charge for interest per ton very small, this item of working cost is most important. Now various means have been adopted to reduce this cost, which I shall simply report upon without recommending any in particular.

One of these methods has been, and continues to be adopted by the Superintendent of the Manchester and Leeds Railway, who, after having had considerable experience of the effect of working the locomotives in the usual way at the direct cost of the Company, let the work by contract to the engine-drivers and others, including supply of coke, oil, &c., and repair of engines; the result was astonishing, the saving being found to be as 17 to 30, or more than one-half.

I am informed that it was curious to see the effect of this plan in keeping regularity on the line. On arriving at a station, if there were any unusual delay, immediately the engine-driver whose steam was being thereby wasted, and whose profits were proportionately diminished, roused the guards and superintendents, and thus his interest succeeded better in introducing regularity than the supervision of the police. The saving in materials, coke and oil, was quite unexpected in amount.

I learn "that on the Great Western Railway the engine-drivers have had for some time the benefit of an arrangement similar to that of the Manchester and Leeds. A certain fixed amount of coke per mile is allowed to them, and the quantity saved by them at the week's end is taken note of, and they receive a certain per centage of the value of the coke thus saved. The effect produced is seen in the smallness of the present fixed allowance per mile as compared with the quantity allowed at first." My informant, who has tested the efficacy of the principle, adds, "I think there can only be one opinion as to the policy of giving the mechanic a direct interest in his work."

On the Paris and Orléans line a bonus is held out for a similar object to the engine-drivers, and locomotive department generally, by giving them a share in the profits arising* from the saving they effect in the consumption of coke. The expenses by that plan diminished upwards of 7 per cent. in 1844 as compared with 1843, the difference in the cost of coke being only 2 per cent. in the corresponding years.

The same Company carry still further the principle of allowing their *employés* to participate in the surplus profits where these have reached above a certain per centage, and the following details explain the general plan hitherto followed in the distribution of such profits.

The Paris and Orléans Railway Company conceive that they have obtained, from this regulation, results highly satisfactory. The arrangement consists in holding out encouragements for efficient services performed with due attention to economy, by giving a right to the persons employed in the service of the Company to a participation in the profits above 8 per cent., according to a scale dependent upon the relative station and usefulness of each.

For the year 1844 the division of profits was made according to the following statement:—

(The exchange is taken at £1 = 25 francs.)

	Fs.		£
The total receipts for the year were........	6,901,786	=	276,071
Expenses	3,286,662	=	131,466
Net receipts............	3,615,124	=	144,605

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* See Report, dated 29th March, 1845, page 17.

	Fs.		£	£
Brought forward				144,605
The statutes regulate the application of this surplus as follows:—				
1 per cent. sinking fund on the capital stock of the Company	400,000	=	16,000	
3 per cent. interest on redeemed and redeemable shares	1,200,000	=	48,000	
Annuity to Mr. Leconte, the grantee	12,000	=	480	
Dividend to the shareholders, equal to 8 per cent. per annum, including the interest on the redeemed and redeemable shares, and the sinking fund	1,600,000	=	64,000	
				128,480
Total payments as fixed by the statutes	3,212,000	=	128,480	
Excess to be accounted for as follows				£16,125

	Fs.		£	s.	d.
15 per cent. on this surplus to be divided among the officers and men of the Company	60,468	=	2,418	14	4
Remains for additional distribution among the shareholders	342,655	=	13,706	0	0
Which added to the	1,200,000				
and	1,600,000				
previously set aside, gives	3,142,655	=	125,706	0	0

Or at the rate of about 9 per cent. on the capital stock of the Company.

Mode of Distribution.

The distribution of the 15 per cent. above mentioned was regulated as follows:—

The officers and men employed by the Company are divided into three classes, viz.—

In the first,—engineers and superintendents.—The managers of departments and such others among the responsible officers as may be deemed entitled to be ranked in this category by the Directors.

In the second,—all responsible officers not included in the first, and such others as may be deemed entitled by the Directors.

In the third are comprised all others engaged by the year in the service of the Company, *i. e.*, receiving an annual salary.

For the first class, each one will be entitled to $\frac{1}{300}$ of the 15 per cent. for every 1000 francs (£40) of his annual salary.

For the second class, the participation will be $\frac{1}{500}$ for each 1000 francs (£40) of annual salary; one-half the share so falling to each member of this category shall be invested either in stock or in a savings' bank, to be held in trust for the benefit of the person entitled, by the Directors of the Company, whose sanction will be required for the withdrawal or assignment of the same; the second half will be paid in cash.

The balance will be assigned to the members of the third class as follows:—

The one-half shall be assigned among all the members, in proportion to their respective annual salaries, and be similarly vested either in the savings' bank or stock, in the name of the Company as trustees, for the benefit of each. The second half shall be distributed in cash, on the recommendation of the superintendents, to those members of the division who shall have distinguished themselves.

For 1844 these additions to the annual incomes were as follows:—

	Fs.		£	s.	d.
For the 1st class, the total salaries of which amounted to 70,000 fs. (£2,828), the increase was rather more than 20 per cent. on the salaries	14,260	=	570	8	0
For the 2nd class, the total salaries of which amounted to 103,800 fs. (£4,152), the increase was rather more than 12 per cent. on the salary	12,552	=	502	1	7
For the 3rd, the total salaries of which amounted to 743,572 fs. (£29,743), the increase was rather more than 4½ per cent. on the salary	33,665	=	1,346	12	0
Totals	60,468	=	2,419	1	7

Whatever may be the means taken to hold out encouragement to the subordinate servants of railway companies, I believe that it is very important for the interests of the public, as well as those of the railway companies themselves, that some means should be devised to make the *employés* directly interested in the increase of profits which they may be instrumental, although it may be only to a small degree, in producing.

The superior officers of a great company will, generally, be supported in the very great mental exertion and bodily fatigue their arduous duties call upon them to undergo, by their sense of justice to their employers, and the praiseworthy desire for distinction and consequent improvement in their positions and incomes; but such motives cannot be supposed to influence equally all the subordinate servants, down to the very workmen; and there can be no doubt, that upon the willing efforts of all, without excepting those in the most subordinate grades, will the successful introduction of reforms, tending to the very economical conveyance of great numbers of passengers and great quantities of goods, in an essential degree depend.

Nothing is further from my views, than the adoption of any expression that could be construed into a belief, that the subordinate *employés* of railways would *consciously* relax in their efforts to discharge their duties efficiently; it is, on the contrary, universally acknowledged, that railway companies are exceedingly well served; still, where a man's salary constitutes the whole of the revenue he derives from his office, and with little prospect of any increase in his salary by extra exertions, it is not in human nature generally to volunteer these exertions beyond the requirements of ordinary routine business.—"It is the interest of every man to live as much at his ease as he can; and if his emoluments are to be precisely the same, whether he does or does not perform some very laborious duty, it is certainly his interest, at least as interest is vulgarly understood, either to neglect it altogether, or, if he is subject to some authority that will not suffer him to do this, to perform it in as careless and slovenly a manner as that authority will permit. If he is naturally active and a lover of labour, it is his interest to employ that activity in any way from which he can derive some advantage, rather than in the performance of his duty from which he can derive none*."

The increase in goods traffic, where it is to depend either upon the diversion of existing traffic from inferior channels into which habit continues to drive it, or upon the creation of new traffic by the facilities offered, may be undoubtedly effected by the individual efforts of those officers, who by their situations come into frequent contact with the controlers of such traffic—the station superintendents for example. If these knew that their emoluments would be increased in proportion to any increase in the traffic at their stations—they would, if in an agricultural district for example, avail themselves of their opportunities of contact with the farmers of their neighbourhood, to point out to them the advantages offered by the railway for the conveyance of manure, or agricultural produce—if in a mineral district, or a locality possessed of any natural product imperfectly explored, they would make it their study to learn the wants of such districts as regards facility of transit, and if necessary make such wants known, or point out the required improvements. The results of such activity and exertions at one station or in one isolated case would be insignificant; but if a spirit of this kind could by any system be infused into all the members of the general body of the assistants, the results of their united exertions would in the aggregate be most important.

If, on the other hand, the *employés* feel that by increase of labour they only add to their own toil without any corresponding increase in their emoluments, the majority will allow things to remain as they find them, and feel no desire beyond that of just doing their duty and no more.

When on lines of railway already commanding very great traffic, observations are made tending to show that by some light extra exertion, or by trifling alterations in arrangements to meet public demand, the conveyance of a new class of goods can be secured, or its quantity much increased—sometimes the remark is made, "that really the line is as full as it well can be, and any great addition will only tend to create confusion."

At other times, the recommendation to open out a new source of income to a railway by the carriage of some species of heavy goods hitherto conveyed by canal, is met by the observation, that "really the goods trains are already so numerous as to interfere sadly with the passenger traffic"—"that the latter is the most profitable, and therefore the most worthy of all attention,"—and thus an improvement is delayed, or it may be altogether omitted.

Now it is questionable whether such observations would occur, if with every increase of traffic, and consequent increase of profit, a corresponding increase took place in the emolument of the servants of the Company.

There would be no difficulty in selecting appropriate illustrations of great improvements that have been brought about by the enlightened exertions of persevering managers of railway traffic, and in relation to goods as well as passengers. So little has hitherto been done, however, towards rendering railways available for the carriage of provisions, that I prefer giving one or two examples of what has been accomplished in this way—taking for instance the supply of fish, as being an article of food, the conveyance of which is by no means popular with traffic superintendents, and it may be fairly added with the public also, owing to the careless and positively offensive way in which it is thrust in sometimes in the same carriages with second and third-class passengers.

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* Dr. Adam Smith's "Wealth of Nations," book v. cap. 1.

Until lately, but small attention had been paid to the conveyance of fish to Manchester, and its price then ranged from 6*d.* to 1*s.* per lb. At that time the weekly supply brought chiefly from Hull was about three tons per week per railway. Through the exertions of Captain Lawes, facilities were offered for the conveyance of fish from Hull to Manchester at rates similar to those charged for the ordinary heavy merchandise amounting to 16*s.* to 20*s.* a ton, or about one-tenth of a penny per lb. At first the great reduction in the cost of carriage had but little effect on the price, the fish vendors continuing to sell the fish at much the same rate as before, and consequently the amount brought by railway was increased but little. The principle of competition was brought to bear upon the fish sellers, and the consequence has been a reduction in the price to 1½*d.* to 2*d.* per lb.

The carriage by railway has increased from three tons to eighty tons weekly—thus the Railway Company as carriers, the public as consumers, and the fishermen as producers, have all been gainers by this improvement, the result of the exertion of an enlightened manager.

It must not be supposed that even so trifling a change as this from the established practice can be accomplished without trouble. To prove the reverse, it is sufficient to state that the fish from Hull to Manchester has never got further, as the Liverpool and Manchester Company refused to carry it on the same terms.

The Preston and Wyre Company and the Manchester and Bolton Company established a similar fish trade from Fleetwood to Manchester, but it was suddenly stopped by the North Union Company (an intermediate link) insisting on a charge larger than both the other Companies' charges put together.

During the scarcity of hay which prevailed last season, the Manchester and Bolton Railway and the Preston and Wyre Railway Companies carried hay from Ireland to Manchester, at a charge for 50 miles of 10*s.* 4*d.* per ton, and this with the charge for the sea transit and the land transit on the Irish side, still left the hay considerably cheaper than that to be then purchased from the immediate neighbourhood.